side. On the superior and shelving surface is an inclined plane or platform, of the proportions of 60 feet wide, and 160 feet in length, the lower edge of which is angularly immersed into the water about 15 feet at an angle of from 20° to 30°, and thus when moored by both ends athwart the sea, it presents to the waves or winds an inclined plane, or artificial floating beach. From the peculiar circumstance of this *artificial beach* projecting a height of fourteen feet above the water angularly downward *far below, and before the source of buoyancy* of the caisson, on the shelving side of which it is built, no agitation from without can reach, or effect, or impart any motion to the floating structure (except, indeed, the general depression of a few inches), but, on the contrary, each wave is received on the superior surface of the inclined plane, up which they roll, the barrier or caisson at the same time resting beyond the reach of, and screened from, every undulation, it, in fact, rests upon the smooth and comparatively undisturbed water, gently receding from the presence of the waves, and then, by a natural reaction, without exertion or strain, parries the fury of every succeeding surge, which as quickly recedes. There does not appear to be any limit assigned to the dimensions to which the barrier may be extended.

Captain Sleigh proceeds to lay down the following principles as far as relates to construction of floating breakwaters.

1. That any floating breakwater capable of being held by moorings, and supported on the surface of the sea, the buoyancy of which is exposed to the undulation of waves (no matter, if even deeply immersed) by accommodating itself to each billow, by becoming a part and parcel of every surge, allowing each to pass unaffected within the floating structure, will inevitably fail.

2. That any floating breakwater, whether cylindrical or raft-like, of open work, be the form prismatic or flat, which does not possess *extreme buoyancy*, will fail.

3. That any floating breakwater, which is not calculated to turn aside the cause of the waves, namely, to divert the wind obliquely from off the surface of the sea, by having a considerable angular elevation above the crest of the billows, and at the same time by offering a positive but modified resistance to every surge, while its source of buoyancy is perfectly sheltered from the effects of the waves, and does not rest undisturbed on the smooth water line, will inevitably fail.

4. That any floating breakwater that does not admit of being increased to any size without affecting its peculiar principles, or endangering its security, will fail; and that any structure of a *floating nature* which does not remove the cause of the waves (the wind) will produce no effect whatever, and inevitably fail.

5. That any floating breakwater must fail which does not possess the following three principles, viz.:—1, *extreme buoyancy*, sheltered from the effects of the sea; 2, *oblique repulsion*, through the means of an artificial beach erected on the above buoyancy, and interposed between it and the waves, angularly immersed, and rising out of the waves at an angle varying from 20° to 30°, thus offering a positive but modified resistance to the wind and waves, capable of refracting the former upward and over its shelving surface, and of throwing back the latter on themselves; and 3, *angular immersion* and *reaction*, obtained from the combination of the above elements, which give to the whole structure the power of supporting on its area the pressure of the tempest and the waves, whilst its source of buoyancy is perfectly excluded and shielded from both.

Captain Sleigh demonstrates these statements in the following manner:—The first assertion is founded on the fact, that all floating structures, whether cylindrical, with deep shutters suspended from its lower side, or of a raft-like prismatic shape, as the frame of a ship without planks, and having their buoyancy exposed to the waves, when moored broadside to the sea and tide, yield to every undulation. Such are at one moment on the summit of the billows, and the next in the hollow between, each successively passing within its line; one extreme end is elevated on the top of the wave, whilst the other is depressed into the trough of the sea. The second assertion appears manifest, as any floating structure without sufficient buoyancy to resist the pressure of the sea and tide would be borne down, and every wave would roll uninterruptedly over its foundered hull. The third assertion is founded on an argument that the winds being the exciting cause of the waves, any rude attempts made through the means of a floating structure (cylindrical or raft-like) to break above the crest of the waves, will be unovoidable, there being no positive resistance opposed to the cause or the effect, and hence all such attempts would fail. In support of his fourth objection, he assumes that, in consequence of the wind being the primary cause of the agitation of the sea, that must to a great extent be averted, or no shelter can be afforded or effect produced by a floating structure, and that if any attempt be made to turn aside the wind, without at the same time arresting the surge from a considerable depth below the trough of the sea, by presenting a modified resistance, such attempt will be equally futile. The fifth objection is supported by the fact that the larger the cylinders or rafts are made, the more inevitable will be their destruction, whilst it would be found much more impracticable to moor them. Captain Sleigh concludes these observations by alluding to the frequent circumstance of even nautical men confounding the shelter and effect produced by reefs of rocks which are just on a level with the trough of the sea, with what they suppose should be afforded in like manner by means of rafts or any other floating surface. He states that they forget that the former natural obstacles are immovably fixed by an immeasurable bar, their outward surface opposing and checking the whole *sett* of the sea, while their crest presents an unyielding barrier to the sea, and breaks up with stubborn firmness every giant surge. Not so, however, is it with the structures already described, as they yield to every undulation of the waters. Captain Sleigh concluded with the description of the imperishable material under water which he uses as moorings, namely, *cocoa-nut fibre*, with anchors of granite. In conclusion it may be stated that the peculiar advantages of building his buoyant sheltered sea-having arisen from the circumstance that there being no lateral strain on the timbers or frame-work, and from the fabric being constantly like an inverted arch, the crest of which is sustained by the broad and smooth surface of the sea within the artificial beach, every point of the platform is supported by pillars proceeding from the curvex and interior side of the curve alluded to, like radii from a centre, while the structure receives the modified force on fixed points. It is therefore requisite that strength should be afforded where the power is applied, and hence the lateral substance of the athwart ship or transverse carlines and stauncheons may be very inconsiderable. (B.)

BLUE LIAS LIME AND WARWICKSHIRE BLUE STONE.

Our advertising columns will have called the public attention to the introduction into the London market of the new materials specified above. It is on account of this novelty that we are led to notice them, and it is our intention to give similar notices of all such matters as come before us. There are a variety of most interesting products, natural and artificial, and many establishments and processes in manufacture, with which it is important that the builder should be acquainted. In the very class of articles upon which we now treat, there is a variety almost beyond enumeration, and if each of the parties interested in the introduction of them to public use will favour us with particulars, it will be our pleasing duty, as in this instance, to lay those particulars before the public eye.

The blue lias stone is well known amongst geologists as offering, in the extent of its formation and its quality, an inexhaustible and invaluable source of supply for the building requirements of this great country; and at no point of the stretching of that great belt across England, commencing at Lyme Regis and passing away to the north-east, is there to be found a more valuable working than this at Southam, now being brought into the London market through the enterprise of Mr. Greaves. It is true that the reduction of canal dues, consequent on the opening of the railways, has of itself tended to give, and in fact formed the main facility for the introduction of such products from the interior of the country to London. Yet, nevertheless, there is something of special acknowledgment due to those who, like Mr. Greaves, make the first adventure—who beat down and consolidate the path for their followers.

London is, however, well provided with limes and cements, and the principal ground of recommendation of this Southam Blue Lias is its superiority, considering its cheapness, for water-works and in damp situations; it is not less an advantage either that it comes in at a quarter of the town particularly favourable to the consumers who are so far removed from the banks of the river. The Paddington Canal Basin is so situated with respect to a great building district of London, as to stand in the light of the natural *depôt* or import dock for the locality around it, and since this lias forms an excellent lime for ordinary stucco work (many houses in the western vicinity of London being faced with it), as well as a cement for drains, water-courses, and foundation-work, for which we understand it is being prescribed by some of our metropolitan surveyors, we feel assured that it must come into general use, and that with this extension of its use—cheap as it is at present—a larger consumption will enable the importers, if we may so term them, to give it at still lower prices to the public.

It is important to architects, surveyors, and builders, to be made acquainted with these matters, and we are best performing our functions by running in quest for, and having obtained it, giving the information in this vehicle to them. We lament that the question of the chemics of lime and cement composition are so little known amongst us, that to the building fraternity a discussion on such a subject would have a technicality so as to command little general interest, but it will be our endeavour to strip the matter of this, and to present it in familiar language. A little science, united to the homely practical knowledge of the workman, would be of infinite service; the phraseology which sets forth concerning this blue lias stone, that it contains from 87 to 95 per cent.* of carbonate of lime, and all the vocabulary of analysis, might be made as familiar to the ordinary comprehension as to the simple housewife is the mixing up of her bread, or the compounding of a pudding, and it shall not be our fault if it is not so, both through the medium of this paper, and, as we have elsewhere stated, in reference to the proposed "Builders' Institute" or School. Why should it be difficult for a man to determine why a process of ordinary slaking is inapplicable to that of compounding mortar from this blue lias lime? a knowledge of its qualities would tell him what experience only has led to, that a great dashing of water is inimical to success, and that what is called care is necessary, but which in fact is more properly speaking a saving of trouble, and a more agreeable manipulation, namely, a gentle sprinkling of water and the covering of sand for twelve or fourteen hours, when it will be reduced to a fine powder; it is a question, however, in most of these cases whether grinding is not the more advantageous method altogether; grinding by the manufacturer or importer, by which is saved labour to the consumer, as well as in mixing up; economy in the admixture of sand, of which it thereby takes a larger portion, and in the avoidance of waste.

The price for the lime in the lump is 12s. 6d. per yard, and that which is ground 1s. per bushel; but as we observed before, a large consumption, as in all other cases, will no doubt correspondingly reduce the price, perhaps as low as 9d. per bushel.

To those who are familiar with the paving of the midland districts of England, the product of the Stratford quarries is well known; the blue and white squares form a very handsome floor for halls, vestibules, and passages, and including all charges, can, we find, be laid down complete at 1s. 1d. per foot; inlaid with marble in fancy patterns, and in several varieties, it averages about 2s. per foot.

* This is from the analysis of Professors Daniel and Phillips.

For more information on this Compression and OCR go to our website